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RUDDERFISHES AT WOODS' HOLE IN 1920

Rudderfishes representing three families came under observation at Woods' Hole, Mass., in 1920.

The very attractive *Seriola zonata* was represented by several specimens, 5 to 7 inches long, taken under floating material in Vineyard Sound and kept in the aquarium of the Bureau of Fisheries during parts of August and September. In the absence of a suitable hover, this species will seek refuge under almost any small objects. In the aquarium, a smaller specimen used to swim under a larger one and both sought the protection of a threadfish *(Alectis ciliaris)* only 5 inches long.

Palinurichthys perciformis was more abundant in Vineyard Sound during the latter part of August than during any of the numerous occasions extending over 25 years when I have been at Woods' Hole. On certain days almost every floating box, barrel, plank and mass of eel-grass or rock-weed served as a shelter for this rudderfish, and some of the larger rafts of seaweed covered hundreds of specimens ranging from 6 to 12 inches long. Many were secured with a small dipnet thrust suddenly under bits of seaweed from a slowly moving motor boat.

The Rudderfish, sometimes called Bermuda Chub *(Kyphosus sectatrix)*, is not common in southern Massachusetts and is not observed every year at Woods' Hole. On October 15 one was taken in a trap in Buzzard's Bay; this specimen, like most of

those that have been recorded from this northern limit of range, was about 6 inches long.

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DATA ON LOCAL FISHES FROM THE NEW YORK AQUARIUM

This past summer (1920) the Aquarium's new collecting boat, "Sea-Horse," made frequent trips in the lower bay for fishes, most of which were obtained from the pound nets there. Comparing her log-book with previously compiled data on the seasonal occurrence of marine fishes near New York City, brings to light certain observations which are an addition to that data. These are given below:—

Clear-nosed Skate *(Raja eglanteria)* was common during the summer. October 5 is a late date for the occurrence of this species.

Sting Ray *(Dasyatis centrura)* is now uncommon locally. One is noted on the trip of June 20-22 and one on Sept. 23.

Cow-nosed Ray *(Rhinoptera bonasus)* is rare locally. A specimen was taken on trips of June 13-14, September 3 and September 10-11.

Lafayette *(Leiostomus xanthurus)* was common throughout the season, being present on the first trip made, June 1, which is early for this species.

Croaker *(Micropogon undulatus)* is only rarely common locally as it was this year. It was first taken on the trip of June 13-14, and one was obtained on that of July 21-22. It is again mentioned in the fall, on the trips of October 10-11 to October 21-22, which is late for it.

Butterfish *(Poronotus triacanthus)* are ordinarily abundant in the fall. A single one is reported on the trip of June 20-22, and its occurence became frequent beginning with that of August 5-6.

Pilot-fish *(Seriola zonata)*. Both very early and

very late dates obtained for this species, July 21-22 and November 7-8.

Yellow Mackerel *(Caranx crysos)*, October 21-22 is a late date for its occurrence locally.

Trigger-fish *(Balistes carolinensis)*. October 5 is a late date for this rare species.

Puffer *(Spheroides maculatus)*. Many were met with on almost every trip. Though their numbers fell off the middle of October they were obtained on the last trip made, November 7-8.

Spiny Boxfish *(Chilomycterus schoepfii)* One July 21-22. It became more frequent beginning September 23.

Shark Sucker *(Echeneis naucrates)*. One taken October 10-11 is a late date.

Daylight or Star Flounder *(Lophopsetta maculata)* was present on June 1 and throughout the season, but not recorded on five trips between August 1 and September 20.

C. H. Townsend,
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MORE ABOUT A YELLOW PERCH PROBLEM

Referring to an article "A Yellow Perch Problem" in *Copeia*, No. 88, it certainly is a peculiar situation. My own theory in regard to conditions in these two ponds has been that the perch in the big pond have run out with long years and increasing numbers until, like the trout in certain streams, they have grown smaller and smaller in average size, possibly for lack of food. There are such large quantities of them that the pickerel and bass can not keep the numbers down; therefore, they multiply beyond all possibility of securing food to make them grow.

On the other hand, in the upper pond there are so many pickerel that the number of perch is all the time kept reduced and those that survive find some food. The pickerel in the big pond grow large and fat while

those in the upper pond are small and thin and never in very good condition.

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GROWTH OF FISH IN DIFFERENT WATERS

Referring to a note on the Yellow Perch published in *Copeia,* No. 88, the information in regard to the two waters is not sufficient to warrant drawing any conclusions. Generally speaking, it would naturally be expected that the pond of larger area would produce fish of the largest growth.

The variation in the maximum size of various species of fish in different waters has never been fully accounted for. It often happens that a chain of lakes inhabited by brook trout yields a maximum growth of a pound or more in one lake; in another lake, perhaps, a half-a-pound, and in a third lake of perhaps larger area than the other two trout in great abundance of a size seldom exceeding a quarter-of-a-pound in weight. This variation applies also to many other species. It has been my personal experience on one trout pond of about 35 acres with a maximum growth varying from year to year according to the number of fish inhabiting the pond. In other words, if the pond was fished hard, thus reducing the total number of adult fish which reached the spawning grounds, the average weight of the mature fish was quite a little more than in years when the pond was not fished so hard and larger numbers of mature fish reached the spawning grounds. In this particular case the fish when ascending to spawn were trapped and it was possible for a number of years to record the number of mature fish ascending a tributary stream for the spawning function as well as the average weight of the fish.

On general principles the abundance of food determines the maximum growth of fish in such a pond.

The perch are more versatile in their food habits

than most fresh-water species. I do not think that a suggestion that the perch in the big pond have "run out" due to inbreeding is correct. However, it may be true that where conditions do not promote large growth the fish become mature while small and it may be that the offspring of such fish would naturally be stunted, but not necessarily so. It has been my experience that fish of small growth under certain conditions, when transferred to a larger lake, eventually attain a much larger size. This is particularly true in the case of reservoired lakes. In other words, if the pond referred to should be raised several feet so that it covers two or three times the present area, I should naturally expect that after two or three years the perch would average very much larger than they do now. Pearse has made some very valuable contributions on this subject one of which appears in a scientific monthly of an early date in which is a popular contribution covered by a more serious and complete report published in the Bulletin of the U. S. Bureau of Fisheries for 1917-1918. In that report he compares two lakes, one of which was much deeper and of larger area than the other. In the particular instances coming under his observation he concluded that the deep lake is a better habitat than the shallow one for Yellow Perch and attributes a small maximum size to the fact that there are very diverse conditions which prevent growth. In the lakes investigated by him food does not appear to be as important as other factors, such as shallowness, exposure to the wind, etc. In other words, the shallow lake being exposed to the winds oftentimes prevents the perch from having access to their natural feeding grounds, while on a deeper lake this species can go into deep water below the stratum affected by the winds and adjust itself to the deep water conditions.

J. W. Titcomb,
New York Conservation Commission.

SOME DOUBTFUL POINTS IN THE LIFE-HISTORY OF *Notophthalmus viridescens.*

Investigators who have worked on this animal now agree that it passes through three stages in its life-history.

1. An aquatic larval stage with external gills and broad tail, lasting from three to five months.

2. A land stage in which the tail is narrow, compressed but somewhat rounded, the color generally red and the habitat strictly terrestrial. The duration of this stage is usually placed at two or three years but in the light of some measurements which I have made on a large series I believe that four years would be more accurate.

3. An adult aquatic form of viridescent color and broad flat tail.

A few zoologists are still in doubt about the uniform occurrence of the land form. Jordan in his exhaustive paper on the habits and development of this animal says that none of the adults are found below a certain size. But he also says: "It is quite possible that certain individuals attain maturity without ever leaving the water."

I do not agree with the last statement for two reasons: First, when the larva loses its gills the tail becomes round, the newt swims with difficulty and is unfit for life in the water. If given the opportunity it will always crawl out of water and hide in moss or other shelter. Secondly, measurements of a series of 427 individuals show that Jordan's first statement is correct. All but five of these measured over 80 mm. in total length, and of these five the shortest was 77 mm.

Measurements of the land form show that it seldom grows much larger than the minimum size of the water form. Out of a series of 82 specimens eleven measure more than 80 mm., the longest two being 94 and 95 mm.

Lack of space prevents giving more data at the present time. In brief, the measurements show that the larvæ at the time of metamorphosis measure from 29 to 32 mm., the land form ranges from 32 to 95 mm., and the adult from 77 to 124 mm.

These figures fit in so well with the outline of the life-history given above that comment is hardly necessary.

The second question is one of habits and habitat. Why is it that the land form is found in hundreds in certain localities at certain seasons, while in other places where the water form is abundant it is extremely rare?

I can go to seven pools or streams within a mile of my home in central Maine and find the water form or the larva at te right time of year but in all my life I have never seen more than five or six specimens of the land form from that locality. The fact that no intermediate sizes are found in the water leaves me convinced that all the individuals pass through the land stage, but where are they?

In some regions, usually hilly, the land form is very abundant, coming out in large numbers after showers. Is it possible that the nature of the country changes the habits of the animal? Such an explanation does not seem very plausible to me but I can think of no better.

Perhaps this question is not more puzzling than the scarcity of the adults of *Ambystoma punctatum* in spite of the abundance of their eggs and larvæ in the spring months. But *Ambystoma* always hides except for a little while during the breeding season, while *Notophthalmus* sometimes appears plentifully.

Possibly some of the readers of *Copeia* who live where the land form is abundant could enlighten me on this point.

PHILIP H. POPE,
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Phyllodactylus IN CALIFORNIA

I captured a specimen of *Phyllodactylus tuberculosus* in western Imperial County under the following circumstances: Nov. 26, 1920, Mr. Charles Sternberg and I were collecting fossils on what is known locally as Coyote Mountain. On most maps it is called Carrizo Mountain. It is a dozen miles north of the Lower California boundary. Late in the afternoon we started for camp, following down a rather steep canon on the eastern slope. The day had been warm and although the sun had been behind the high peak to the west an hour or more the rocks were still warm. About half way down the canon, at about 1500 feet altitude, I passed a big marble boulder that had long before rolled down from the steep hillside. A lizard ran across the perpendicular polished side of the boulder, stopping at the edge of a crevice. At the moment I thought it was a fence lizard and made a grab for it. All I got was its tail as it darted into the crevice. The crevice was shallow and taking the hammer and chisel I had been using in cutting shells out of the limestone, I soon cut away enough of the shallow crevice to uncover the lizard and took it out. On getting it free I saw that the toes had pads at the tips, the pads appearing white or translucent in the rather dim light. It struck me then that no fence lizard could have run across the nearly perpendicular polished face of the boulder, and that I had a gecko. I had carelessly dropped the tail and was unable to find it in the brief time I could spare to hunt for it in the coarse gravel at the base of the boulder.

I sent the gecko to the Museum of Vertebrate Zoology for comparison. Mr. Storer identified it as *Phyllodactylus tuberculosus*. This species is said to be rather common in the Cape St. Lucas region of Lower California but I can find no record from much farther north.

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